Masonic Homes
of the R. W. Grand Lodge F. & A. M. of Pennsylvania

JOSEPH E. MURPHY, N.H.A.
Executive Director

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111622

December 7, 1995

Sherry L. Gallagher
Project Manager
United States Environmental Protection Agency
Code 3HW22
841 Chestnut Building
Philadelphia, PA 19103

Re: Elizabethtown Landfill-
Masonic Homes 200' Well

Dear Ms. Gallagher:

During our meeting with Congressman Gekas on November 6, 1995, EPA recommended that we present information supporting our position that the manganese contaminating our 400' foot well was a result of the Elizabethtown Landfill. We have prepared the enclosed document for your review and consideration in this matter.

I have also enclosed a revised map of the locations of the Masonic Homes 200', 400', and 500' wells. I reviewed with our maintenance department the history of the 200' well. We do not know the date the well was installed, nor do we know its construction. I am told that the well was installed to irrigate crops and to fill our ponds during dry seasons. The last time the well was utilized was 1983 to fill our lower pond. The well pumped dry in two to four hours. It has not been used since that time.

The Masonic Homes looks forward to working with EPA on finding a remedy for the Elizabethtown Landfill that will protect the interests of the community as well as the Masonic Homes. Please contact me if I can be of further assistance in this matter.

Sincerely,

Robin L. Pepperman

Robin L. Pepperman
Director of Safety Services

RLP/bne

enclosures (2)

c: Thomas C. Voltaggio, EPA
Tom Santaniello, Congressman Gekas' office
Joseph E. Murphy

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December 5, 1995

Ms. Sherry L. Gallagher
Project Manager
U.S. Environmental Protection Agency
Region III
814 Chestnut Building
Philadelphia, PA 19107-4431

RE: Manganese in Ground Water
GSL Project G0694.010

Dear Ms. Gallagher:

On behalf of the Masonic Homes of Elizabethtown, Pennsylvania, GeoServices, Ltd. is pleased to submit these comments on manganese in ground water as it relates to the Elizabethtown Landfill and supply well EM400 owned by Masonic Homes. This discussion is an addendum to the "Comment on Proposed Remedial Action Plan" submitted to the Environmental Protection Agency (EPA) on September 25, 1995 and has been prepared in response to our meeting of November 6, 1995. These comments are generally limited to a discussion of manganese. Previous comments regarding other aspects of ground water and ground water quality are incorporated by reference to the September 25, 1995 submittal.

EXECUTIVE SUMMARY

The Masonic Homes is a continuing care retirement community and children's home which depends on ground water to provide nearly 200,000 gallons per day (gpd) of potable water to more than 2.000 residents and staff. This water is used for both drinking and laundry purposes. This supply is currently provided by a single well (EM500). To reduce reliance on a single well, well EM400 was developed by the Masonic Homes to serve as a potable water supply source for the facility.

Since drilling of the well in 1981, high concentrations of manganese (730 micrograms per liter (μg/l) in 1981) have rendered the well unusable. These high concentrations of manganese in EM400 have consistently exceeded the SMCL of 50 μg/l. Golder Associates (Golder) and Waste Management have asserted that the high concentration of manganese in EM400 is comparable to background concentrations and is not associated with ground water degradation resulting from activities at the Elizabethtown Landfill. The U.S. EPA has apparently accepted this theory without completing its own assessment and evaluation of the occurrence of manganese in natural waters in the Triassic sedimentary rocks in central Pennsylvania. Reasonable scientific inquiry into the relationship between ground water impacted by the landfill and water quality in water supplies at the Masonic Homes requires full and complete consideration of background quality. Had the agency completed an independent evaluation of the relationship between manganese occurrences in EM400 and degradation of ground water in the vicinity of the landfill, it would have concluded that:

- The high concentration of manganese in EM400 is the direct result of degradation of ground water due to landfill activities.

- A clear relationship exists between degraded ground water from the landfill and impacts to Masonic Homes' water supply well EM400.

- Treatment or replacement of water from EM400 must be an integral part of the proposed Remedial Action Plan for the Elizabethtown Landfill.

In order to assist EPA in understanding the relationship between the natural occurrence of manganese in ground water in Triassic sedimentary rocks in central Pennsylvania, the occurrence of manganese in ground water degraded by the Elizabethtown Landfill, and the occurrence of manganese in EM400 at the Masonic Homes, the data used in support of the various arguments have been summarized and presented in this letter. Also included is a summary of regional data concerning ground water quality and the natural occurrence of manganese in ground water in geologic formations similar to those in which the landfill and EM400 are located.

Manganese does not occur naturally in ground water in the concentrations observed at the Elizabethtown Landfill. The basis for the arguments used by Golder and Waste Management to support the theory that the high manganese concentrations in EM400 are natural include gross misrepresentation of data from the Johnston (1966) report, reliance on data from "upgradient" wells (wells which at best are questionable indicators of "background" conditions at the landfill), and failure to consider the large amount of data available in the literature concerning the low manganese concentrations in natural ground water from wells developed in Triassic sedimentary rocks elsewhere in the region.

PREVIOUS DISCUSSIONS

The EPA presented three arguments during a November 6, 1995 meeting with Masonic Homes which it felt supported the position that the manganese observed in well EM400 was representative of background concentrations and not related to the Elizabethtown Landfill. Each of these arguments is restated below along with a response which shows that the manganese in well EM400 is indicative of contamination from the landfill.

Argument No. 1. *The EPA restated Golder's and Waste Management's position contained in the Remedial Investigation (RI) that because manganese is a common metal in the Triassic rocks the manganese concentrations observed in the ground water are also common.*

Response to Argument No. 1. This conclusion is simply not true. The overwhelming evidence shown by the historical ground water sampling results and regional data is that manganese at the concentrations observed in EM400 does not occur unless contamination is suspected.

The RI cited a technical report by Johnston (1966) which describes the regional background concentration of manganese. The Johnston report states that "naturally occurring iron and manganese do not appear to be present in objectional amounts in ground water throughout most of the area" underlain by the New Oxford Formation. Johnston (1966) further states that the water sample with the maximum manganese concentration reported in the New Oxford Triassic rocks was "contaminated by a refuse burial site" (Elizabethtown Landfill). Golder and Waste Management incorrectly characterized these same results by stating in the RI that "high levels of iron and manganese have been reported in some wells." In addition, the RI omitted the reference to contamination by the landfill as discussed in Johnston's report.

We urge the EPA to revisit Johnston (1966) and form its own independent conclusions regarding manganese in ground water near the Elizabethtown Landfill rather than merely accepting the conclusions presented by Golder in the RI..

Argument No. 2. *Manganese in ground water from upgradient wells occurs at concentrations similar to those observed in EM400.*

Response to Argument No 2. This argument is based on the results of testing of ground water from locations in close proximity to the landfill. A total of eleven sampling locations are grouped together in the RI and designated as "upgradient/background" sample locations (page 86 of the RI). A comparison of the manganese results from these wells shows some concentrations which are much higher than any other sampling results from published sources indicating that they are not representative of background ground water quality.

The average manganese concentration for all samples collected from these wells (total of 23 samples) is 193 μg/l and the average weighted manganese concentration (i.e., average concentration of the mean sampling results for the individual wells) is 107 μg/l. As compared to regional data, both of these results are much higher than published results of manganese concentrations in ground water from similar rock types. This comparison shows that the grouping of these wells together in the RI and considering them to be representative of background conditions is inappropriate.

In addition. two sampling locations (EP2 and EU14D) are located within 200 feet of the landfill and one location (RES03) had extremely divergent results for manganese from samples collected on different sampling dates (16.4 μg/l and 533 μg/l). For this well, EPA **assumes** that the sample with the **higher** concentration (533 μg/l) is representative of natural conditions in spite of overwhelming contradictory data from Johnston and other published reports (see attached table and reference list). In fact, it is not possible to tell which sample is correct from only two samples which are so dissimilar. However, based on the published results it is more likely that the sample with the **lower** concentration (16.4 μg/l) is more representative of natural background concentrations and that the sample with higher concentrations may have included entrained particulate manganese. Finally. for ground water from another location (EU25), manganese concentrations ranged from 184 to 526 μg/l.

In spite of this lack of agreement with published results, the EPA chose to compare the **highest** reported concentration based on one sample from EU14D and compare it to downgradient concentrations to assess background. This argument is flawed. because based on the published results, the highest results are clearly an anomaly and are **not** representative of natural conditions.

Because of the close proximity of some wells to the landfill and the overwhelming information regarding manganese concentration in ground water from wells completed in the Triassic sedimentary rock, the manganese concentration results used in the RI cannot unequivocally be considered to be representative of upgradient/background conditions at the site.

Finally, in establishing background conditions, EPA must consider only these wells which can be shown unequivocally to be unrelated to conditions at the landfill. To do otherwise is inconsistent with the National Contingency Plan and EPA OSWER guidance on RI/FS and related CERCLA site investigations.

Argument No. 3. *If well EM400 is downgradient of the landfill and impacted by contamination from the landfill, there should also be volatile organic compounds (VOCs) detected in the samples collected from EM400.*

Response to Argument No. 3. The highest manganese concentrations which were reported in both the RI and in Johnston (1966) were at locations which are clearly contaminated by the landfill. As shown in the RI, a direct correlation exists between the spatial distribution of manganese and total VOC concentrations with the highest concentrations of both VOCs and manganese occurring adjacent to the landfill. In addition, examination of the VOC plume presented in the RI shows that both the manganese and VOC concentrations decrease downgradient away from the landfill and toward EM400. The absence of VOCs in EM400 may be the result of one or more processes such as dilution of VOCs near EM400; differences in the transport between manganese and VOCs near EM400; or localized variation in the hydrogeologic conditions near EM400. None of these factors, or any other factors relative to the relationship between manganese and VOCs in EM400 were addressed in the RI and no technical foundation for the absence of VOCs in EM400 has been established.

Therefore, there is no technical justification for concluding that the absence of VOCs in EM400 shows that the manganese is not related to the landfill. In fact, the overwhelming body of evidence indicates the opposite: that manganese at concentrations found in EM400 is not naturally occurring and that the elevated manganese levels in EM400 is clearly related to contamination from the landfill.

PUBLISHED DATA

Review of readily available published reports regarding ground water in Triassic sedimentary rocks in central PA (see attached reference list) indicates that the data overwhelmingly support the argument that natural occurrences of manganese in ground water from rock units identical to or equivalent of the New Oxford rocks in the Elizabethtown area have manganese concentrations which do not even come remotely close to the concentrations observed in EM400. A review of published reports of wells developed in Triassic sedimentary rocks in Eastern Pennsylvania revealed that **only** in those wells associated with the Elizabethtown Landfill, another Superfund site (Olmstead Air Base) or shallow surface water do the concentrations of manganese approach the concentrations in EM400. Also, based on the published information, it is evident that an iron/manganese concentration ratio which is greater than one is a consistent indication of natural ground water quality. Conversely, only in waters impacted by the landfill (or another Superfund site, or by shallow conditions), is the ratio less than one. In EM400, the iron/manganese concentration ratio is consistently less than one (as low as 0.14), further indicating a departure from natural conditions and supporting the argument that the manganese in well EM400 results from landfill contamination.

The published reports reviewed provide data on 186 wells developed in Triassic sedimentary rocks identical to or equivalent to the sedimentary rocks in the immediate vicinity of the landfill and EM400. As shown on the table, the data show the following relationships:

- Ground water from wells **not** associated with a landfill or a Superfund site contains concentrations of manganese which range from 0.00 milligrams per liter (mg/l) to 0.39 mg/l (the 0.39 mg/l concentration was from a shallow, hand dug well apparently influenced by near surface conditions).

- In addition, the median concentration of manganese in ground water **not** associated with a landfill or Superfund site ranges from 0.00 mg/l to 0.03 mg/l.

- The iron/manganese ratio in ground water **not** associated with a landfill, a Superfund site, or surface water conditions is consistently greater than one (the few exceptions to this rule are in those instances where the concentration of iron and manganese are reported to be very close to the detection limit for these compounds (e.g., iron and manganese reported at 0.02 mg/l or 0.01 mg/l where the detection limit for iron or manganese was established at 0.01 mg/l)).

- Ground water from EM400 has shown the following:

  - Manganese concentrations ranging up to 656 μg/l as reported in the RI (730 μg/l during initial testing of the well in 1981).

  - Iron/manganese ratios which are consistently less than one.

SUMMARY

Based on available published information, information from documents generated as part of the remedial process at the Elizabethtown Landfill, and open file information from the Pennsylvania Geologic Survey, it is clear that the ground water in the Masonic Homes production well, identified as EM400, contains high concentrations of manganese which are directly attributable to the landfill.

In selecting a remedy, EPA must consider three key criteria: threshold, primary balancing and modifying [40 C.F.R. §300.430(f)(1)(i)(A)-(C)]. The threshold criteria requires overall protectiveness of human health and the environment to be considered in compliance with any applicable relevant and appropriate requirements ("ARARs"). In addition, the long-term effectiveness and permanency of the remedy must be considered under the primary balancing criteria. Under both these criteria, and given the fact that the SMCL of 50 μg/l for manganese has consistently been exceeded in EM400, the EPA must consider the SMCL for manganese in evaluating the extent and scope of any ground water pump and treat system and monitoring program in connection with the remedy selection at the Elizabethtown Landfill.[1]

In addition, given EPA's expectation in selection of a remedy that ground water be returned to beneficial use [C.F.R. 380.430(a)(iii)(F)], given the fact that manganese is recognized as the major contributor to non-cancer risk at the site, that the water from EM400 is intended for both drinking and laundry purposes, and that the source of manganese in EM400 is related to the Elizabethtown Landfill, treatment or replacement of this well needs to be included in the proposed Remedial Action Plan for the Elizabethtown Landfill.

In accordance with EPA regulations and guidance, we request, on behalf of Masonic Homes, that these comments and our September 25, 1995 "Comments on Proposed Remedial Action Plan" be made part of the administrative record for the Elizabethtown Landfill (EPA Final Guidance on Administrative Records for Selecting CERCLA Response Actions, OSWER Directive No. 9833.3A-1, Dec. 3, 1990 at 30.31.)

[1]The Pennsylvania Safe Drinking Water Act program incorporates the SMCL within the state definition of maximum contaminant level (25 Pa Code §109.1). Moreover, compliance with the SMCL is required by public water supply systems, a compliance schedule which includes the Masonic Homes (§109.202(b)). Therefore, the exceedence of the secondary standards at Masonic Homes' well requires, at the very least, monitoring and re-evaluation of treatment options. The water from the well serves residents at Masonic Homes' nursing home facilities. EPA Records of Decision ("RODs") identifying manganese as a constituent of concern exceeding the secondary standards have established a risk-based cleanup level. EPA has evaluated average and reasonable worst-case concentrations for manganese based on the SMCL. (See East Mt. Zion Landfill, York County, Pennsylvania, June 29, 1990 ROD).

We appreciate your consideration of these comments and your re-evaluation of the impacts of the landfill on Masonic Homes' water supply wells (especially EM400). If you or your technical staff have any questions regarding this information, or if you wish to discuss this issue in more detail, please do not hesitate to contact us.

Very truly yours,

GEOSERVICES, LTD.

Joseph T. McNally, P.G.
Project Director

Peter G. Robelen, P.G.
President

Attachments

xc: Mr. Thomas C. Voltaggio (EPA)
Mr. Tom Santaniello (Congressman Gekas' office)

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MANGANESE CONCENTRATIONS (MG/L) IN TRIASSIC* ROCKS OF SOUTHEASTERN PENNSYLVANIA

Formation	County	Number of Wells	Minimum	Maximum	Median
New Oxford - 2.3.6.8†	Adams	16	0	.11	.03
	Lancaster	27	0	.24	.01
	York	14	0	.39	.03
Gettysburg - 3.5.6	Adams	22	0	.05	.01
	Dauphin	1	—	—	.02
	Lancaster	3	0	.04	.01
	Lebanon	3	.01	.03	.03
	York	3	<.01	.01	<.01
Hammer Creek - 4.6	Berks	1	—	—	.02
	Lancaster	4	.01	.04	.03
	Lebanon	15	0	.04	.01
Gettysburg and Hammer Creek undifferentiated - 7	Berks	3	0	.03	.01
	Chester	6	0	.02	.01
	Dauphin	19	0	.537‡	.017
	Lancaster	4	0	.04	.005
	York	13	0	.06	0

MANGANESE CONCENTRATIONS (MG/L) IN TRIASSIC* ROCKS OF SOUTHEASTERN PENNSYLVANIA (Continued)

Formation	County	Number of Wells	Minimum	Maximum	Median
Brunswick - 1	Berks	9	.01	.24	.02
	Montgomery	20	0	.38	.015
Lockatong - 1	Montgomery	3	0.00	0.00	0.00
Total Number of Wells		186			

Notes

* All formations on Table 1 were formed from Triassic sediments in the Newark-Gettysburg basin.
† Designates reports from which data was collected: see reference list.
‡ Values are from wells at the former Ormstead Air Force Base, a Superfund Site.

REFERENCE LIST

1. Dunn GeoScience Corporation, "Water Resource Evaluation," prepared for the Masonic Homes at Elizabethtown, Pennsylvania, 1981.

2. Johnston, Herbert E., "Hydrogeology of the New Oxford Formation in Lancaster County, Pennsylvania." *Water Resource Report of the Pennsylvania Topographic and Geologic Survey, Pennsylvania*, W23, 1966.

3. Longwill, S. M. and C. R. Wood, "Groundwater Resources of the Brunswick Formation in Montgomery and Berks Counties." *Water Resource Report of the Pennsylvania Topographic and Geologic Survey, Pennsylvania*, W22, 1965.

4. Poth, Charles W., "Summary of Ground Water Resources of Lancaster County, Pennsylvania." *Water Resource Report of the Pennsylvania Topographic and Geologic Survey, Pennsylvania*, W43, 1977.

5. Royer, Denise W., "Summary Groundwater Resources of Lebanon County, Pennsylvania." *Water Resource Report of the Pennsylvania Topographic and Geologic Survey, Pennsylvania*, W55, 1983.

6. Taylor, Larry E. and Denise W. Royer, "Summary Groundwater Resources of Adams County, Pennsylvania." *Water Resource Report of the Pennsylvania Topographic and Geologic Survey, Pennsylvania*, W52, 1981.

7. Taylor, Larry E. and William H. Werkheiser, "Groundwater Resources of the Lower Susquehanna River Basin, Pennsylvania." *Water Resource Report of the Pennsylvania Topographic and Geologic Survey, Pennsylvania*, W57, 1984.

8. Wood, Charles R., "Groundwater Resources of the Gettysburg and Hammer Creek Formations, Southeastern Pennsylvania." *Water Resource Report of the Pennsylvania Topographic and Geologic Survey, Pennsylvania*, W49, 1980.

9. Wood, P.R. and H. E. Johnston, "Hydrology of the New Oxford Formation in Adams and York Counties, Pennsylvania." *Water Resource Report of the Pennsylvania Topographic and Geologic Survey, Pennsylvania*, W21, 1964.

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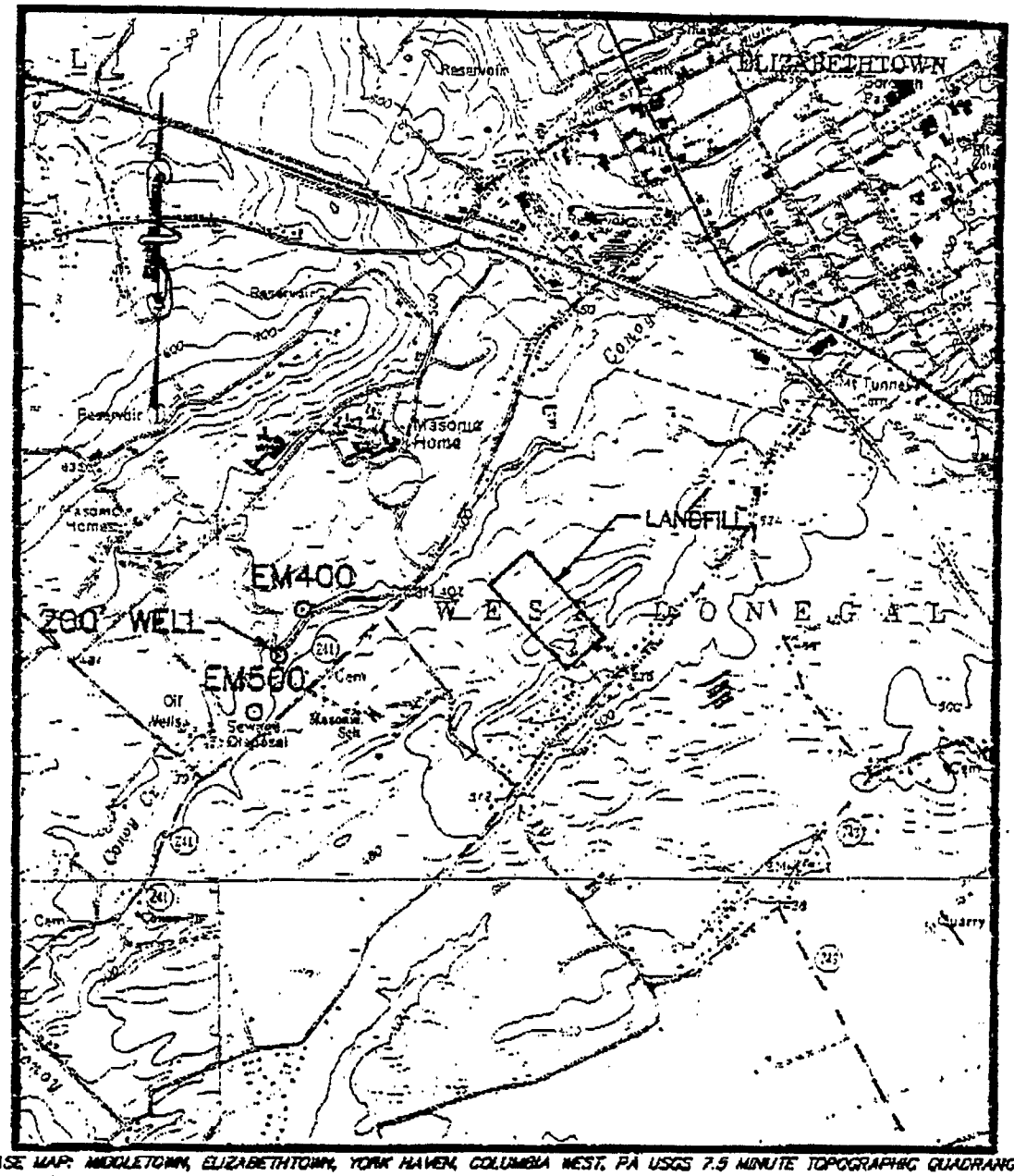

BASE MAP: MIDDLETOWN, ELIZABETHTOWN, YORK HAVEN, COLUMBIA WEST, PA USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLES

0 2000 4000

SCALE: 1"=2000'

DATE: SEPT. 1995	MASONIC HOMES WEST DONEGAL TOWNSHIP, LANCASTER COUNTY, PENNSYLVANIA WELL LOCATIONS	REVISIONS
DRAWN BY: JWN		
CHECKED BY: LMW		PROJECT NO.: G1394.020
APPROVED BY: PGR	GeoServices, Ltd Harrisburg, PA	CAD FILE NAME: MH-MAP2

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